REMARKS/ARGUMENTS

I. Concerning the Amendments

Claim 19 is amended to indicate that the composition of Claim 19 contains less than about 9 weight percent of water. Support for this amendment is found in Applicants' examples. New Claim 29 also contains this provision. New Claim 28 specifies that component b) is a compound of formula III.

II. Concerning the Status of the Claims

The Office Action does not indicate that Claims 1-10 are pending. Applicants submitted a Supplemental Amendment on January 9, 2009 to clarify that the status of Claims 1-10 is "withdrawn" as opposed to "original" as indicated in the response filed in September 2008. Therefore, Applicants submit that the actual status of Claims 1-10 is withdrawn, and that Claims 1-10 are not cancelled.

III. Concerning the Rejection under 35 USC 102(b)

Claim 19 stands rejected under 35 USC 102(b) as anticipated by Bedell. Examiner's rationale is that since the abstract of Bedell uses the word 'amines,' Bedell discloses compositions that are mixtures of amines, and therefore Bedell discloses compositions within the scope of Applicants' original Claim 19.

Bedell addressed the problem of finding an improved inhibitor compound to inhibit the oxidation of sulfites in systems where SO_2 is being removed from a gas stream. Bedell teaches that, in a process for scrubbing sulfur dioxide from a gas stream using an alkali solution, certain cationic polyelectrolytes can inhibit the oxidation of sulfites to sulfates. The polyelectrolytes are chosen from water soluble polymers containing quaternary amine groups.

Applicants' claims are directed to compositions and processes useful for selective removal of COS from gas streams. Original Claim 19 is directed to a composition comprising a specified pyrimidinone and at least one alkanolamine compound of formula II or a piperazine compound of formula III. Claim 19 is amended herein to indicate that the composition of Claim 19 comprises less than about 9 weight percent of water.

Bedell discloses the addition of 1-3000 ppm of water-soluble, polymeric cationic electrolytes to sulfite-containing aqueous alkali scrubbing solutions that contain amines selected from a very large group of several types of amines, including amines such as

piperazines and pyrimidones. At col. 4, lines 24-26, Bedell states: "The present invention resides in the discovery that quaternary polyamine electrolytes serve as oxidation inhibitors in sulfite solutions." At col. 13, lines 49-52, Bedell states: "The scrubbing amines are generally employed in sulfur dioxide scrubbing solutions at a concentration of from about 0.1 molar up to their saturation concentration in water." Bedell does not explicitly state any upper limits of amine concentrations as weight percentages.

The upper limit of piperazine solubility in water under various conditions is discussed in *J. Chem. Eng. Data*, "Thermophysical Properties of Aqueous Piperazine and Aqueous (N-Methyldiethanolamine + Piperazine) Solutions at Temperatures (298.15 to 338.15) K, A. Muhammad et al., XXXX, xxx, 000, (Accepted for publication April 21, 2009) (hereinafter Muhammad). As shown in Figure 1 of Muhammad, the solubility of piperazine in water appears to level off at about 75% by weight. Muhammad thus discloses that the *minimum* percent water in an aqueous piperazine/water system is likely to be about 25% by weight. Thus, Bedell does not disclose a composition having less than about 9 wt. percent water. Therefore, reconsideration of the novelty rejection of Claim 19 over Bedell is requested.

IV. Concerning the Rejection under 35 USC 103(a)

Claims 19 –20 and 23-28 stand rejected under 35 USC 103 as being obvious over Wagner et al. (hereinafter Wagner) in view of Bedell.

Examiner's rationale is as follows. Bedell teaches the use of various activators, such as piperazines and pyrimidinones, in combination with polymeric polyelectrolytes for SO_2 removal processes. Wagner *claims* a process for "selectively" removing COS from a hydrocarbonaceous fluid stream using an aqueous amine solution consisting of the polymeric polyelectrolyte, and specified amounts of aliphatic alkanolamine and an activator selected from the group consisting of piperazine, methyl piperazine, and morpholine. Examiner argues that Wagner also *discloses* that the activator can be selected from the following group of aliphatic alkanolamines: monoethanolamine, monomethylethanolamine, and diethanolamine. Examiner concludes that since Bedell allegedly teaches that piperazine and pyrimidinones are functional equivalents for SO_2 removal, it would be obvious to replace the piperazine of Wagner with the pyrimidinones of Bedell in order to obtain a solution of aliphatic alkanolamine plus pyrimidinone useful to selectively remove COS.

As stated hereinabove, Applicants' claims are directed to compositions and processes useful for selective removal of COS from gas streams.

Applicants' Claims 19 and 28 specify a water content of less than about 9 wt. percent. Neither Wagner nor Bedell disclose a composition having a low amount of water. The minimum level of water needed by Wagner is 30%, as the maximum amount of total amine content in the Wagner aqueous scrubbing liquor is 70%. See Wagner, Col. 5, lines 18-20. As argued hereinabove, Bedell does not disclose compositions having less than about 9 wt. percent water. Therefore, neither reference teaches or suggests the subject matter of Applicant's claims that specify a water content of less than about 9 wt. percent.

Examiner argues that Bedell teaches that piperazines and pyrimidinones are "functional equivalents." While this may or may not be true for SO_2 removal, which is the problem addressed by Bedell, Bedell teaches nothing about the equivalence of piperazines and pyrimidinones for selective COS removal. There is no teaching in the art to suggest that there would be a reasonable expectation of success associated with using a solution that is known to remove SO_2 in order to selectively remove COS.

What Wagner actually teaches about the identity of the activator is unclear. Wagner *claims* a process for "selectively" removing COS from a hydrocarbonaceous fluid stream using an aqueous amine solution consisting of the polymeric polyelectrolyte, specified amounts of aliphatic alkanolamine, and an activator selected from the group consisting of piperazine, methyl piperazine, and morpholine. Examiner points out that Wagner in the specification *discloses* that the activator can be selected from the following group of aliphatic alkanolamines: monoethanolamine, monomethylethanolamine, and diethanolamine. The problem with that line of reasoning is that the reader does not know whether monoethanolamine is an "activator" or an "aliphatic alkanolamine." Examiner would interpret Wagner as meaning that the activator and the aliphatic alkanolamine are the *same compound* in the case of monoethanolamine, monomethylethanolamine, and diethanolamine. This interpretation is not supported by Wagner's claims nor the remainder of Wagner's specification. In fact, the use of a pure aliphatic alkanolamine solution is described by Wagner Figure 2 and Wagner at col. 9, lines 44-45 as being *comparative*. Thus, one skilled in the art would not interpret Wagner as including monoethanolamine, monomethylethanolamine, and diethanolamine as "activators."

If the aliphatic amines are not "activators" then Wagner does not support the logic of the obviousness rejection, as the substitution of the pyrimidinones of Bedell for the piperazine activator of Wagner results in a solution containing pyrimidinones and aliphatic alkanolamines, i.e. a composition that has no activator. Activator-free compositions are not taught nor suggested by Wagner.

Wagner uses the word 'selective' in connection with COS removal. In fact, however, Wagner discloses a process for *indiscriminately* simultaneously removing essentially equal amounts of COS and CO_2, from hydrocarbon fluid streams using a scrubbing liquid "consisting of an aqueous amine solution containing from 1.5 to 5 mol/l of an aliphatic alkanolamine having from 2 to 12 carbon atoms and from 0.8 to 1.7 mol/l of at least one activator … ." See, e.g., Wagner at col. 4, lines 48-65, where Wagner states as follows: "… the use of an aqueous amine solution containing from 0.4 to 1.7 mol/l of a primary or secondary amine as activator provides a substantially unspecific removal of CO_2 and COS. At mandated processing parameters, therefore, the same percentage of CO_2 and COS is removed." (Emphasis supplied.) In addition, see, e.g., Figure 5 of Wagner, which confirms the latter statement of Wagner. Thus, Wagner's use of the term 'selective' appears to be somewhat different than the normal definition, since removing the *same amount* of 2 materials from a mixture would not appear, from Applicants' perspective, to be 'selective' removal.

For the foregoing reasons, Applicants' respectfully submit that the prior art does not support a prima facie case of obviousness, and that Applicants' claims are not obvious over Wagner in view of Bedell.

Should Examiner still believe that the art supports a prima facie case of obviousness, then Applicants submit that the process and compositions of the invention produce surprisingly good selectivity of COS removal. Selectivity, as defined by Wagner, is the percent COS removed divided by the percent CO_2 removed. Wagner's selectivity values are approximately 1. See Wagner Figure 5 and Wagner at col. 4, lines 48-65. Applicants' specification at Tables 1 and 8 contains data that allows one to calculate the selectivity, using Wagner's definition of selectivity, of Applicants' claimed process and compositions. Specifically, the last line of Table 1 shows that a solvent that is 1,3-dimethyl-3,4,5,6-tetrahydro-2(1H)-pyrimidinone (hereinafter DMTP) and 3% diethanolamine has a selectivity

for COS that is 40.1/0.6 = 66.8. Table 8 summarizes the results of Examples 14 (DMTP + 3% hydroxyethyl piperazine) and 15 (DMTP + 3% methylethanolamine). For Example 14 the selectivity is 69/6 = 11.5, and for Example 15 the selectivity is 100/10 = 10. These selectivities are all surprisingly far greater than Wagner's selectivity of approximately 1.

V. Conclusion

For the foregoing reasons, reconsideration of the claims and passing of the application to allowance are solicited.

Respectfully submitted,

/Paul_D._Hayhurst/_Reg_No._30180
Paul D. Hayhurst
Registration No. 30,180
Phone: 989-636-9373

P. O. Box 1967
Midland, MI 48641-1967

PDH/sk